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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/644,643	08/20/2003	Jian Wang	02-40181-US	5489

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EXAMINER

CURTIS, CRAIG

ART UNIT PAPER NUMBER

2872

DATE MAILED: 03/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/644,643	Applicant(s) WANG ET AL.	
	Examiner Craig Curtis	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Disposition of the Instant Application

- This Office Action is responsive to Applicants' Amendment & Remarks filed on 29 December 2004, each of which having been made of record in the file.
- By their amendment, Applicants have amended independent claims 1, 22, 33, and 39.
- Claims 1-39 are presently pending in the instant application.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter that Applicants regard as their invention.

1. **Claims 1-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.** The meaning of the limitations ...*for maximizing a transmission of a first polarization state while minimizing a reflection of the first polarization state, and for minimizing a transmission for an orthogonal second polarization state while maximizing a reflection of the second polarization state...* [recited in lines 1-4 of claim 1 (emphasis added)] cannot be ascertained. This series of limitations is problematic for a number of reasons. First, the degree to which the transmission of said first polarization state is transmitted is unclear—more specifically, if one were to take the phrase *maximizing a transmission of a first polarization state* literally, one might reasonably expect said radiation polarizer to be capable of transmitting said first polarization state with 100 % efficiency (i.e., maximally), which--owing to inevitable reflection and absorption losses experienced by said first polarization state light (e.g., the P-state

light (13) depicted in Fig. 1 of **Perkins et al.**) as same transits the radiation polarizer of the combination—is a physical impossibility. Such being the case, Applicants are hereby apprised that their maximizing and minimizing limitations will, for the purposes of examination, be interpreted as constituting relative (as opposed to absolute) modifiers. And second, it is noted that the limitations maximizing a transmission of a first polarization state while minimizing a reflection of the first polarization state (emphasis added) are mutually redundant (the same, of course, being the case with respect to the language Applicants' recite with respect to minimizing a transmission & maximizing a reflection of said second polarization state).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Perkins et al. (6,288,840) in view of Garvin et al. (4,289,381).

With regard to claim 1, Perkins et al. disclose the invention as claimed—[a] radiation polarizer [see wire grid polarizer 10 in, e.g., Figs. 1, 8, and 9] for maximizing a transmission of a first polarization state [viz., P (13) in Fig. 1 of Perkins et al.] while minimizing a reflection of the first polarization state, and for minimizing for an orthogonal second polarization state while maximizing a reflection of the second polarization state [in the same manner as that exhibited by the radiation polarizer of the instant application], said polarizer comprising:

Art Unit: 2872

a substrate [1 or 3];

nanostructures [5]; and

a groove layer [see gaps 7], wherein a communicative coupling between said groove layer and said nanostructures polarizes the radiation [cf. ray of light 9, which has both orthogonal electric field polarization states S & P, with ray of light 13, which is solely P-state light], said radiation having an electric field orthogonal to said groove layer being a necessary condition, and wherein said radiation has a wavelength in the range of about 250 nm to less than about a microwave wavelength (a range that encompasses the visible portion of the electromagnetic spectrum (viz., 400 nm to 700 nm), in which range the polarizer of **Perkins et al.** was designed to operate)—**EXCEPT FOR** explicit teachings of the following additionally recited claim limitations:

wherein at least one anti-reflection coating layer is communicatively coupled to said substrate;

wherein said radiation polarizer comprises at least two of said nanostructures and at least two of said groove layers;

wherein each of said at least two groove layers is interstitial to a respective one of said at least two nanostructures; and,

at least one dielectric [read: dielectric material] substantially between said substrate and said at least two groove layers, said at least one dielectric having a refractive index greater than one.

Garvin et al., however, disclose a radiation polarizer [see Fig. 7] having at least one anti-reflection coating layer [i.e., antireflective coating layers 34 & 36, which **Garvin et al.** explicitly

Art Unit: 2872

teach (see column 4, lines 22-25) may be magnesium fluoride (MgF_2)--which, not incidentally, is a well-known **dielectric** material] communicatively coupled to a substrate [viz., 30]; at least two nanostructures [viz., 20 & 22] at least two groove layers [viz., 56 & 72, 74, 76]; and wherein each of said at least two groove layers is interstitial to a respective one of said at least two nanostructures [see gaps 56 between nanostructures 20, & gaps 72, 74, 76, etc., between nanostructures 22]; and at least one dielectric [read: dielectric material, in this case the aforementioned magnesium fluoride layer 36 depicted in Fig. 7 of **Garvin et al.**] substantially between said substrate [30 in Fig. 7] and said at least two groove layers [56 & 72, 74, 76 in Fig. 7], said at least one dielectric having a refractive index greater than one [magnesium fluoride having a nominal refractive index of 1.38].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the invention of **Perkins et al.** such that it further comprise at least one anti-reflection coating layer is communicatively coupled to said substrate, at least two of both said nanostructures and said groove layers, wherein each of said at least two groove layers is interstitial to a respective one of said at least two nanostructures, and at least one dielectric substantially between said substrate and said at least two groove layers, said at least one dielectric having a refractive index greater than one, as taught by **Garvin et al.**, for at least the purpose of achieving optimal polarization discrimination (trans. selectivity), while at the same time maximizing throughput (alt. minimizing reflection losses) of incident radiation due to the presence of said at least one anti-reflection coating layer.

With regard to claim 2, the groove layer taught by **Perkins et al.** comprises grooves. See 56 & 72, 74, 76 in Fig. 7.

With regard to claims 3 & 4, the radiation polarizer of **the combination** further comprises at least one protective layer formed atop said at least one substrate [see layer 64 in, e.g., Fig. 8, said at least one anti-reflective coating, said nanostructures, and said groove layers [please see Fig. 8 of Garvin et al.], said protective layer being formed beneath said at least one substrate, said at least one anti-reflective coating, said nanostructures, and said groove layers being a function of the orientation of said radiation polarizer [please see Fig. 8].

With regard to claim 5, the combination further teaches wherein at least one of said nanostructures comprises a plurality of metallics: see col. 6, ll. 47-52 in **Perkins et al.**

With regard to claim 6, the combination meets the teaching wherein at least one of said nanostructures comprises a plurality of dielectrics, if the structures originally referred to as nanostructures are instead referred to as grooves [substrate groove material 56 of **Garvin et al.** being a dielectric], and vice versa.

With regard to claim 7, air has a lower conductivity than metals. See col. 6, ll. 63-66 in **Perkins et al.**

With regard to claim 8, nanostructures 20 and 22 taught by **Garvin et al.** are not disclosed as being identical.

With regard to claim 9, grooves 72, 74, and 76 of **Garvin et al.** can reasonably be taken as comprising air. Also see col. 6, ll. 63-66 in **Perkins et al.**

With regard to claim 10, the dielectric 56 taught by **Garvin et al.** is a non-air dielectric.

With regard to claims 11-21, please see the teachings of the limitations respectively recited in these claims, as set out hereinbefore and in the text and figures of the references of the combination.

With regard to claims 33-39, please refer to the teachings by the combination of the subject matter disclosed in these claims, as set forth hereinbefore.

With regard to claims 22-32, the structural teachings of the claimed invention by the combination, as set forth hereinbefore, are deemed to have met, by straightforward extension thereof, the method step teachings recited in these claims.

Response to Arguments

3. Applicants' arguments with respect to claims 1-39 have been considered fully but are moot in view of the new ground(s) of rejection presented hereinbefore. More specifically, although the references relied upon in the previous Office Action are still asserted in the present Office Action, the particulars of the teachings of the instant invention by same (necessitated by Applicants' amendment to the claims) have been set out with particularity, as set forth above in the body of the rejections. Applicants are respectfully requested to consider the specifics of the present grounds of rejection (including the indefiniteness rejections with respect to claims 1-21).

Art Unit: 2872

Contact Information

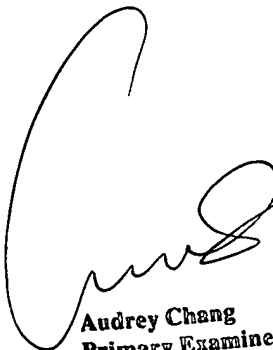
4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Craig Curtis, whose telephone number is (571) 272-2311. The examiner can normally be reached on Monday-Friday, 9:00 A.M. to 6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew A. Dunn, can be reached at (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C.H.C.

Craig H. Curtis
Group Art Unit 2872
17 March 2005



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Primary Examiner
Technology Center 2809